ORAL CARE PRODUCT FOR SENSITIVE ENAMEL CARE

CROSS REFERENCE TO RELATED APPLICATION

This application is a national stage entry under 35 U.S.C. § 371 of International Patent Application No. PCT/US2011/022867, filed on Jan. 28, 2011, which claims priority to U.S. Provisional Patent Application No. 61/299,650, filed on Jan. 29, 2010, which are incorporated herein by reference.

FIELD OF THE INVENTION

This invention relates to anti-erosion oral care compositions that provide erosion protection while maintaining adequate cleaning performance

BACKGROUND OF THE INVENTION

The erosion of dental enamel can lead to pain, discoloration, mechanical failure, and greater susceptibility to dental carries. Chemical erosion of tooth enamel may arise from the presence of acid in the oral cavity. Saliva constituents, mainly proteins and minerals, along with the pellicle are integral in protecting against an erosive challenge. The minerals and proteins in saliva help provide a chemical barrier to slow down or shift the complex dynamic equilibria of hard tissue demineralization, while the pellicle will provide a diffusion barrier to accomplish the same process.

An oral care composition may protect teeth in a variety of ways. Many oral care compositions are designed to increase the pH in the oral cavity. A common strategy when attempting to control oral pH is to include an alkaline agent in the formulation of the oral care composition. The alkaline agent reacts with acid to neutralize the acid, forming water and a salt. This process raises the pH in the oral cavity. However, even when the pH in the oral cavity is high, the pH at the surface of the teeth, where cariogenic bacteria may be present, may be locally lower than the oral cavity in general due to bacterial activity. Soluble bases are not able to preferentially locate at the tooth surface, where acid does the most damage to teeth.

Metal ions are able to protect teeth from erosion. Certain metal ions can react with the surface of the enamel to shift the solubility equilibrium away from dissolution of the tooth's enamel. Some examples of ions that have been investigated for this purpose are calcium, zinc, tin, aluminum, strontium and others. Phosphate salts of these metals have been particularly interesting due to the high phosphate content in dental enamel.

Insoluble or slightly soluble metal compounds have been investigated as metal ion sources for tooth remineralization. By combining insoluble metal compounds with polymers, the insoluble compounds become more easily dispersed in the oral care composition. Additionally, the polymers may improve the residence time of the metal agent in the oral cavity. However, the main benefit of having a source of metal ions would be achieved at the surface of the tooth. Accordingly, there is a need for a long lasting oral care composition that can deliver metal containing compounds to and control pH at the surface of the tooth to prevent dental erosion.

SUMMARY OF THE INVENTION

In accordance with a feature of an embodiment, there is provided a composition and method for the prevention of

dental erosion comprising an oral care composition that includes an orally acceptable vehicle, a copolymer of a methylvinyl ether and a maleic anhydride, a metal compound or salt that becomes more soluble at acidic pH, and an abrasive. While not wishing to be bound by any theory of operation, it is believed that application of the composition to the teeth protects tooth enamel from erosion by forming a barrier of polymer and metal compound at the surface of a tooth. The metal compound is eroded by acids, which substitutes for erosion that otherwise could occur at the tooth. In addition to helping spatially locate the metal compound at the tooth surface, the inventors believe that the copolymer of methylvinyl ether and maleic anhydride may also reduce bacterial adhesion at the surface of the tooth.

In accordance with an additional embodiment, the invention includes a method of reducing acid based erosion of teeth comprising administering an oral care composition comprised of an orally acceptable vehicle, a copolymer of a methylvinyl ether and a maleic anhydride, a metal compound or salt that becomes more soluble at acidic pH, and an abrasive, and optionally applying a shear stress to the composition to shear-align a layer of the copolymer and metal compound to make the layer more homogeneous. When the composition is applied using a shear stress, enhanced erosion protection is derived from the additional homogeneity of the composition.

DETAILED DESCRIPTION

As used throughout, ranges are used as a shorthand for describing each and every value that is within the range. Any value within the range can be selected as the terminus of the range. In addition, all references cited herein are hereby incorporated by reference in their entireties. In the event of a conflict in a definition in the present disclosure and that of a cited reference, the present disclosure controls.

The headings (such as "Background" and "Summary,") used herein are intended only for general organization of topics within the disclosure of the invention, and are not intended to limit the disclosure of the invention or any aspect thereof. In particular, subject matter disclosed in the "Background" may include aspects of technology within the scope of the invention, and may not constitute a recitation of prior art. Subject matter disclosed in the "Summary" is not an exhaustive or complete disclosure of the entire scope of the invention or any embodiments thereof.

The citation of references herein does not constitute an admission that those references are prior art or have any relevance to the patentability of the invention disclosed herein. All references cited in the Description section of this specification are hereby incorporated by reference in their entirety.

The description and specific examples, while indicating embodiments of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention. Recitation of multiple embodiments having stated features is not intended to exclude other embodiments having additional features, or other embodiments incorporating different combinations of the stated features. Specific Examples are provided for illustrative purposes of how to make, use and practice the compositions and methods of this invention and, unless explicitly stated to recite activities that have been done (i.e., using the past tense), are not intended to be a representation that given embodiments of this invention have, or have not, been performed.

As used herein, the words "preferred" and "preferably" refer to embodiments of the invention that afford certain